

Appl. No. 09/503,676
Amdt. dated August 29, 2003
Reply to Office Action of May 2, 2003

REMARKS

This Amendment is in response to the Final Office Action dated May 2, 2003.

Applicants submit herewith a petition to the Commissioner of Patent and Trademarks to extend the time for response to the Office Action dated May 2, 2003 for one month from August 2, 2003, to September 2, 2003.

Claims 1-28 are pending in the present application. Claims 1-28 have been rejected. Claims 1-27 have been amended to further define the scope and novelty of the present invention, for clarification, as well as to correct typographical and grammatical errors. Claim 28 has been canceled. New claims 29-47 have been added. No new matter has been presented. Accordingly, claims 1-27 and 29-47 are pending. For the reasons set forth more fully below, Applicant respectfully submits that the remaining claims are allowable. Consequently, reconsideration, allowance and passage to issue are respectfully requested.

We appreciate the courtesy and helpfulness of the Examiner in the telephone interview of August 18, 2003.

Applicant has presented amendments and arguments below that Applicant believes should render the claims allowable. In the event, however, that the Examiner is not persuaded by Applicant's arguments and amendments, Applicant respectfully requests that the Examiner enter the amendments and remarks to clarify issues upon appeal.

Appl. No. 09/503,676
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35 USC §103 Rejections

The Examiner has stated:

Claims 1-28 are rejected under 35 USC 103(a) as being unpatentable over Boucher et al. (US 6226680 B1) in view of Isfeld et al. (5828835 A).

As per claims 1, 2, 6, 10, 11, 15, 19, 20, 24, and 28, Boucher teaches about a network having a plurality of computer systems each including a processor, a memory (see col. 5, lines 9-11), and network adapter (see col.5, line 2), ... Although Boucher teaches of "adjusting" the pointer (see col. 19, lines 34-41), he does not explicitly teach of storing in a plurality of pointers to locations within the common data buffer, a start and an end location of a next slice of data being sent; adjusting the start pointer to a point to a memory location within the common data buffer...; and adjusting a start pointer to point to a first memory location.... Isfeld teaches of storing...; adjusting the start pointer to point to point to a memory location...; and adjusting the start pointer to point to a first memory location.... It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the teachings of Isfeld with the system of Boucher....without such pointers and their ability to be adjusted, the application program data would be missing some data or contain errors.

Applicant respectfully traverses the Examiner's rejections.

Claim 1

Amended independent claim 1 is provided below for ease of review.

1. (currently amended) In a network having a sending computer system and a receiving computer system, each of the sending and receiving computer systems including a processor, a memory and a network adapter, the memory containing a data structure used for storing a common data buffer, a method for sending and receiving payload data by layers or sub-layers of at least one communications protocol, comprising the steps of:

- (a) storing a first start pointer pointing to a first byte of the payload data in a first common data buffer of the sending computer system;
- (b) adding a first header to the payload data in the first common data buffer at a location preceding the byte pointed to by the first start pointer according to a first protocol layer of the communications protocol at the sending computer system;
- (c) adjusting the first start pointer to point to a first byte of the first header;
- (d) invoking a send procedure of a second and lower protocol layer of the communications protocol at the sending computer system;
- (e) transferring to the second protocol layer the start pointer by the send procedure, wherein the payload data is not copied in preparation for or during the send procedure;

Appl. No. 09/503,676
Amdt. dated August 29, 2003
Reply to Office Action of May 2, 2003

- (f) adding a second header to the payload data in the first common data buffer at a location preceding the first start pointer;
- (g) sending the payload data and the first and second headers to the receiving computer system;
- (h) storing the payload data and the first and second headers in a second common data buffer of the receiving computer system;
- (i) invoking a receive procedure of a second protocol layer of the communications protocol at the receiving computer system;
- (j) storing a second start pointer pointing to a first byte of the second header in the second common data buffer;
- (k) adjusting the second start pointer to point to the first byte of the first header according to the second protocol layer at the receiving computer system;
- (l) invoking a receive procedure of a first and higher protocol layer of the communications protocol at the receiving computer system; and
- (m) transferring to the first protocol layer at the receiving computer system the second start pointer, wherein the payload data is not copied in preparation for or during the receive procedure.

The present invention provides a method for allowing the sharing of code between communications protocol layers and for eliminating the need for copying payload data between protocol layers in a sending system before the payload data is sent and between protocol layers in a receiving system after the payload data is received. A table describing seven standardized protocol layers (the "OSI Model") can be found in the specification beginning on page 2, line 11. The method of the present invention is accomplished by the creation of a generic protocol layer class (GPLC) having send and receive procedures and a common data buffer in which sent or received payload data is placed and acted upon by each protocol layer implemented with the GPLC. Instead of copying the payload data passed to it by a higher or lower protocol layer, a protocol layer acts upon the common data buffer by moving a "start" pointer and an "end" pointer along the data contained in the common data buffer prior to invoking the next higher or lower protocol layer. Each protocol layer can then process the payload data without it having to be copied. This reduces the amount of memory and processing time required for

Appl. No. 09/503,676
Amdt. dated August 29, 2003
Reply to Office Action of May 2, 2003

processing the payload data (Summary). Boucher in view of Isfeld does not teach or suggest these features, as discussed below.

Boucher discloses a system for protocol processing in a computer network and includes an intelligent network interface card, which provides a fast-path that avoids protocol processing for messages, greatly accelerating data communication (Abstract).

However, Boucher does not teach or suggest protocol layers processing payload data where the “payload data is **not copied** in preparation for or during the send procedure” and where the “payload data is **not copied** in preparation for or during the receive procedure,” as recited in the transferring steps (e) and (m) of amended independent claim 1. First, the present invention as claimed is directed to processing payload data **by protocol layers** before the payload data is sent and directed to processing payload data **by protocol layers** after the payload data is received. In contrast, Boucher is directed to transmitting payload data between hosts using a “fast-path” that **bypasses protocol processing** thus eliminating the need for transmitting the payload data between protocol layers. In addition, since the payload data is not processed by protocol layers, the fast-path eliminates the need for headers (Abstract), which are required for protocol processing.

Second, where Boucher mentions protocol processing, Boucher teaches that payload data is **copied** during both send and receive procedures. Boucher describes steps for preparing data for transmission, “each step typically including **data moving and copying**” (column 2, lines 51-54). Furthermore, Boucher describes a receiving procedure where “**repeated data copies may also be necessary** for the receiving host to place the

Appl. No. 09/503,676
Amdt. dated August 29, 2003
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data in an appropriate form at its intended destination” (column 2, lines 64-67). These descriptions strongly suggest that Boucher *teaches away* from the present invention as claimed, where payload data is **not** copied in preparation for or during send and receive procedures of protocol layers.

Isfeld discloses a communication technique for high volume connectionless-protocol, backbone communication links in distributed processing systems provides for control of latency and reliability of messages transmitted. In the message passing process, a command transmit function transmits commands across the back plane according to a queue priority rule. This allows for the control of transmit latency (Abstract).

Isfeld mentions pointers when describing that “transmit buffers are pointed to by pointers” (column 12, lines 26-39). However, Isfeld does not describe in detail how these pointers are specifically used, except of course to point to buffers. Nothing within Isfeld teaches or suggests that the pointers of Isfeld are used in the same manner as recited in the claimed invention.

These differences between the cited references and the present invention as claimed are significant. Using pointers without copying payload data reduces the amount of memory and processing time required for the sending and receiving of payload data. Accordingly, the combination of Boucher and Isfeld does not provide these benefits.

Combining Boucher and Isfeld would provide a way of bypassing the use of protocol layers (Boucher) and a way of controlling of transmit latency (Isfeld). Because this combination avoids the use of protocol layers, Boucher in view of Isfeld does not

Appl. No. 09/503,676
Amdt. dated August 29, 2003
Reply to Office Action of May 2, 2003

teach or suggest transferring and processing payload data between protocol layers wherein the payload data is “not copied in preparation for or during the send procedure” and “receive procedure,” *in combination with* the other steps recited in amended independent claim 1. Therefore, claim 1 is allowable over Boucher in view of Isfeld.

Independent claims 2, 6, 10-11, 15, 19-20, and 24

Amended independent claims 2, 6, 10-11, 15, 19-20, and 24 recite a send- and/or procedure-related steps “wherein the payload data is not copied in preparation for or during the send procedure” and/or “receive procedure.” As described above, with respect to claim 1, Boucher in view of Isfeld does not teach or suggest this feature. Accordingly, the above-articulated arguments related to claim 1 apply with equal force to claims 2, 6, 10-11, 15, 19-20, and 24. Therefore, these claims are allowable over the cited references for at least the same reasons as claim 1.

Dependent claims 3-5, 7-9, 12-14, 16-18, 21-23, and 25-27

Dependent claims 3-5, 7-9, 12-14, 16-18, 21-23, and 25-27 dependent from claims 2, 6, 11, 15, 20, and 24, respectively. Accordingly, the above-articulated arguments related to claims 2, 6, 11, 15, 20, and 24 apply with equal force to claims 3-5, 7-9, 12-14, 16-18, 21-23, and 25-27, which are thus allowable over the cited references for at least the same reasons as claims 2, 6, 11, 15, 20, and 24.

Appl. No. 09/503,676
Amdt. dated August 29, 2003
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New claims 29-47

New independent claims 29, 38, and 39 have been added to further define the scope and novelty of the present invention. Specifically, claims 29, 38, and 39 recite processing the payload data using a second protocol layer, "wherein the payload data is not copied during and between being processed by the first and second protocol layers." Support for claims 29, 38, and 39 is found throughout the specification and in particular on page 5, lines 16-18. No new matter has been presented.

New dependent claims 30-37 and 40-47 depend from claims 29 and 39, respectively. Support for claims 30-37 and 40-47 is found in the original dependent claims and throughout the specification. No new matter has been presented.

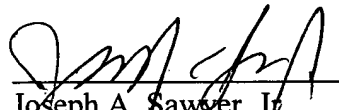
Similar to amended independent claim 1, claims 29, 38, and 39 recite steps "wherein the payload data is not copied." As described above, with respect to claim 1, Boucher in view of Isfeld does not teach or suggest this feature. Furthermore, as stated above, the present invention as claimed is directed to processing payload data **by protocol layers** of a network communications protocol before the payload data is sent and directed to processing payload data **by protocol layers** of the network communications protocol after the payload data is received. In contrast, Boucher is directed to transmitting payload data between hosts using a "fast-path" that bypasses protocol processing thus eliminating the need for transmitting the payload data between protocol layers. Accordingly, the above-articulated arguments related to claim 1 apply with equal force to claims 29, 38, and 39, which is thus allowable over the cited references for at least the reasons stated above.

Appl. No. 09/503,676
Amdt. dated August 29, 2003
Reply to Office Action of May 2, 2003

Dependent claims 30-37 and 40-47 depend from claims 29 and 39, respectively. Accordingly, the above-articulated arguments related to claims 29 and 39 apply with equal force to claims 30-37 and 40-47, which are thus allowable over the cited references for at least the same reasons as claims 29 and 39.

Accordingly, Applicant's attorney believes that this application is in condition for allowance. Should any unresolved issues remain, the Examiner is invited to call Applicant's attorney at the telephone number indicated below.

Respectfully submitted,


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